(12) UK Patent Application (19) GB (11) 2 247 623 (13) A

(43) Date of A publication 11.03.1992

(21) Application No 9019318.6

(22) Date of filing 05.09.1990

(51) INT CL[5]
A61L 9/12, A01N 25/00

(52) UK CL (Edition K)
A5G GV

(56) Documents cited
GB 2222775 A GB 2132280 A GB 2119499 A
GB 1454040 A CH 0657052 A FR 2543832 A
US 4762275 A US 4568521 A US 4161284 A
US 3990848 A

(58) Field of search
UK CL (Edition K) A5G GV
INT CL[5] A01N 25/00, A61L 9/12
Online databases: WPI

(71) Applicant
Secto Company Limited

(Incorporated in the United Kingdom)

Carlinghurst Road, Blackburn, Lancashire, BB2 1PW, United Kingdom

(72) Inventor
Gordon William Woolley

(74) Agent and/or Address for Service
Reginald W. Barker & Co
13 Charterhouse Square, London, EC1M 6BA, United Kingdom

(54) Volatile liquid dispenser powered by rechargeable battery and solar cell charge

(57) Apparatus for dispensing, in vapour form, a volatile liquid (which can be an insecticide, germicide, deodorant, a perfume, a fragrancy, air freshener or the like) has a housing (30) having a air inlet (45), at least one aperture (42) permitting the egress of air and vapour from the interior of the housing, and an absorbant pad (39) at the bottom of the housing (30). (The apparatus of figure 5 functions with the long side (35) orientated horizontally and above the long side (36)). A holder is formed within the housing and serves to hold a volatile liquid container (37) within the housing and above the pad (39), the volatile liquid container (37) being wholly or partly of rupturable material. Rupturing means (47, 48) for rupturing the container (37), a fan (1), and a motor (2*) coupled to the fan are also provided. The fan is positioned in the housing in relation to the inlet (45) so that when the motor is energised, the fan draws air into the housing through the air inlet (45), creates an air flow across the absorbant pad (39) and discharges the air through the aperture or apertures (42). There are provided a rechargeable battery (4*), a solar cell (6*) (which is connected to the rechargeable battery via a charging circuit (7*)) and a timing circuit (5*) through which the rechargeable battery is connected to the motor (2*). The timing circuit is arranged to energise the motor on an on/off timed cycle basis.

*Not shown - see figure 1.

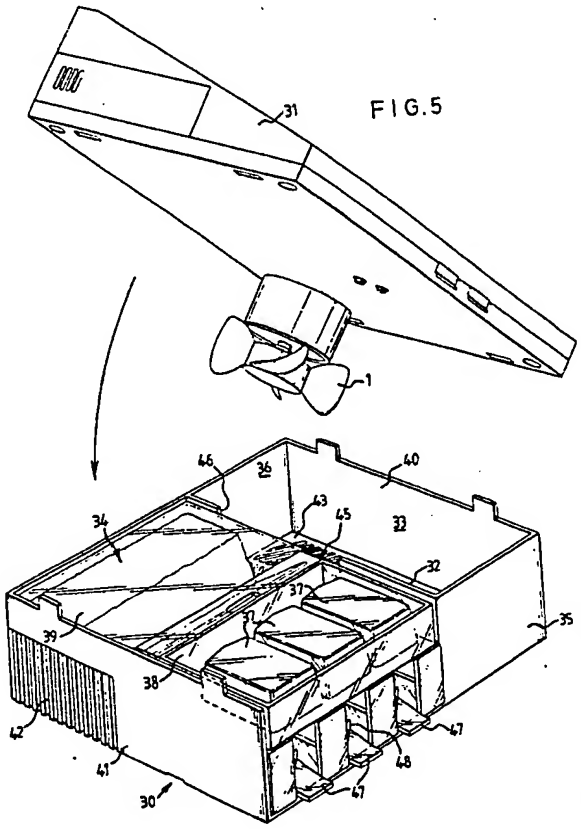

FIG.5

GB 2 247 623 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

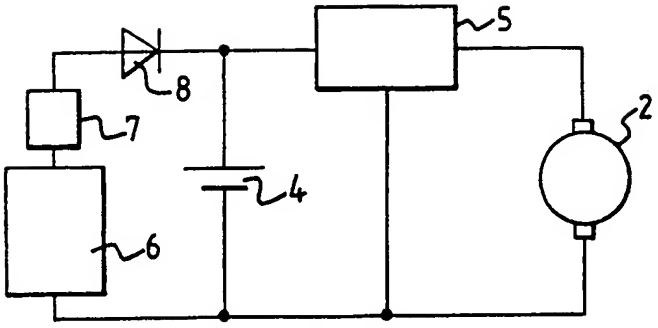

FIG.1

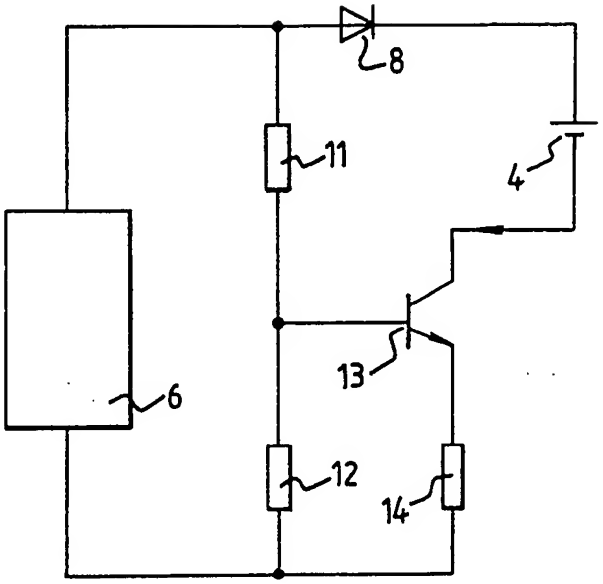

FIG.2

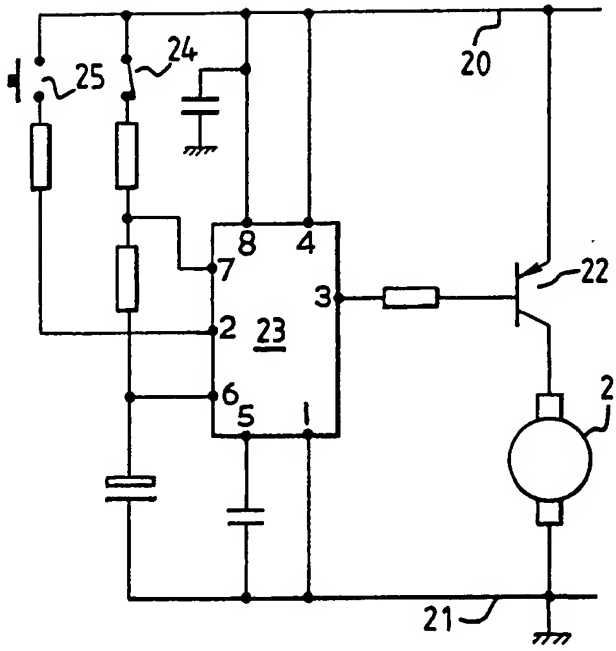

FIG.3

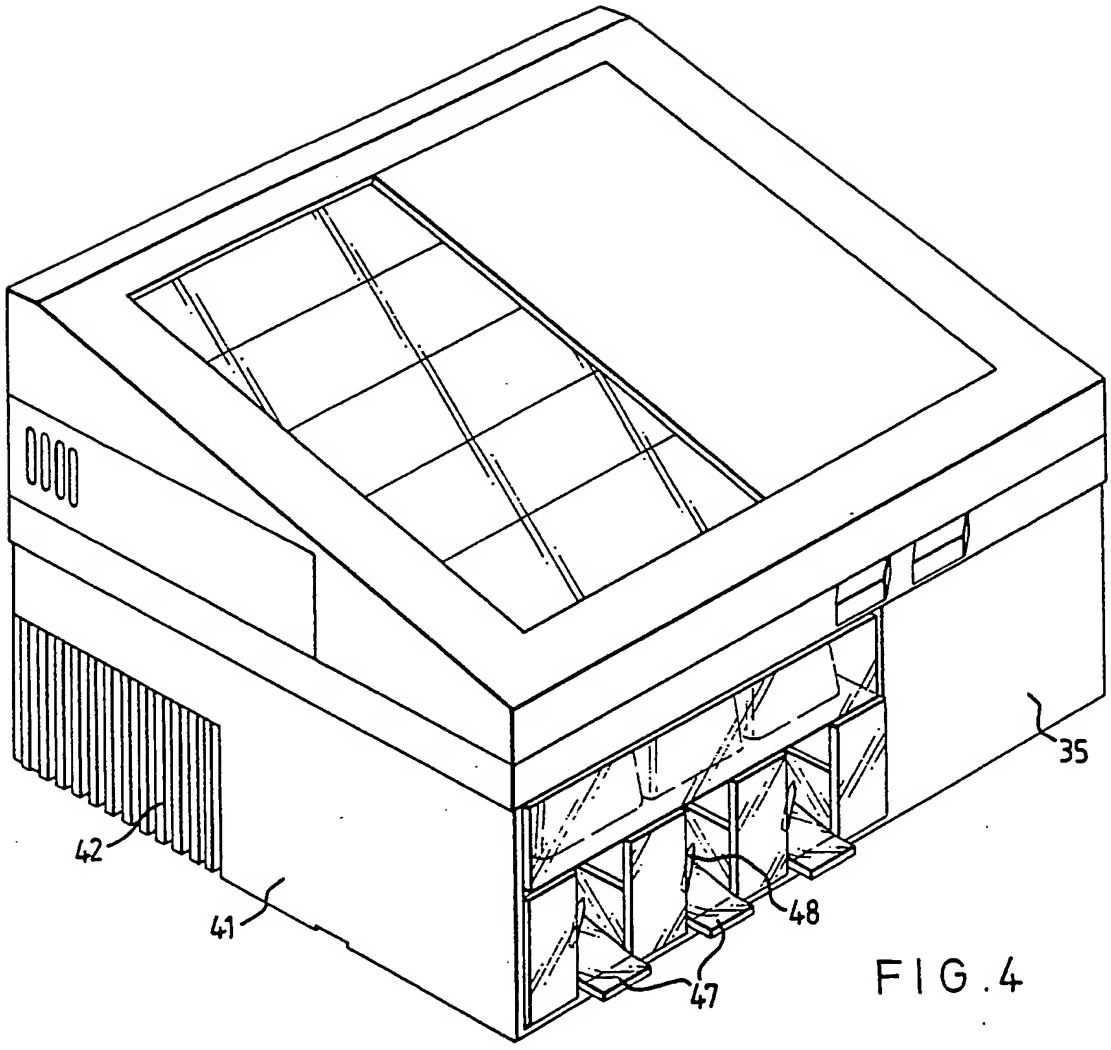

FIG.4

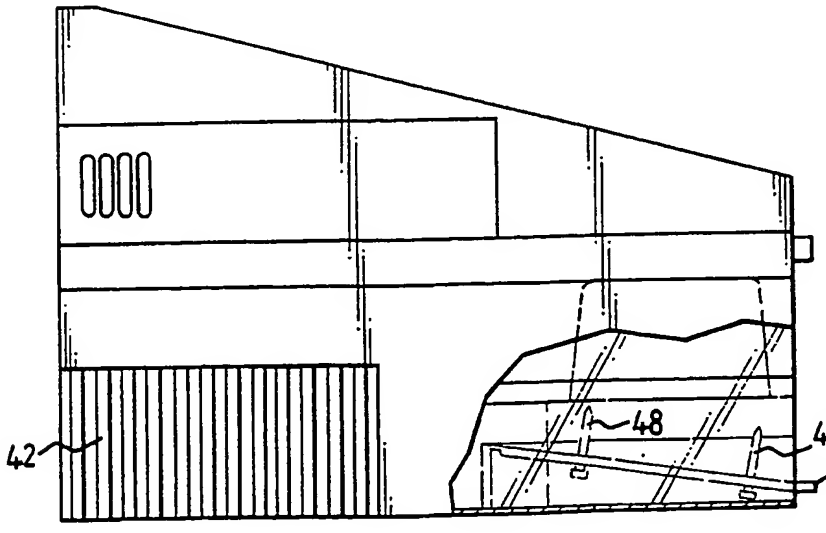

FIG.6

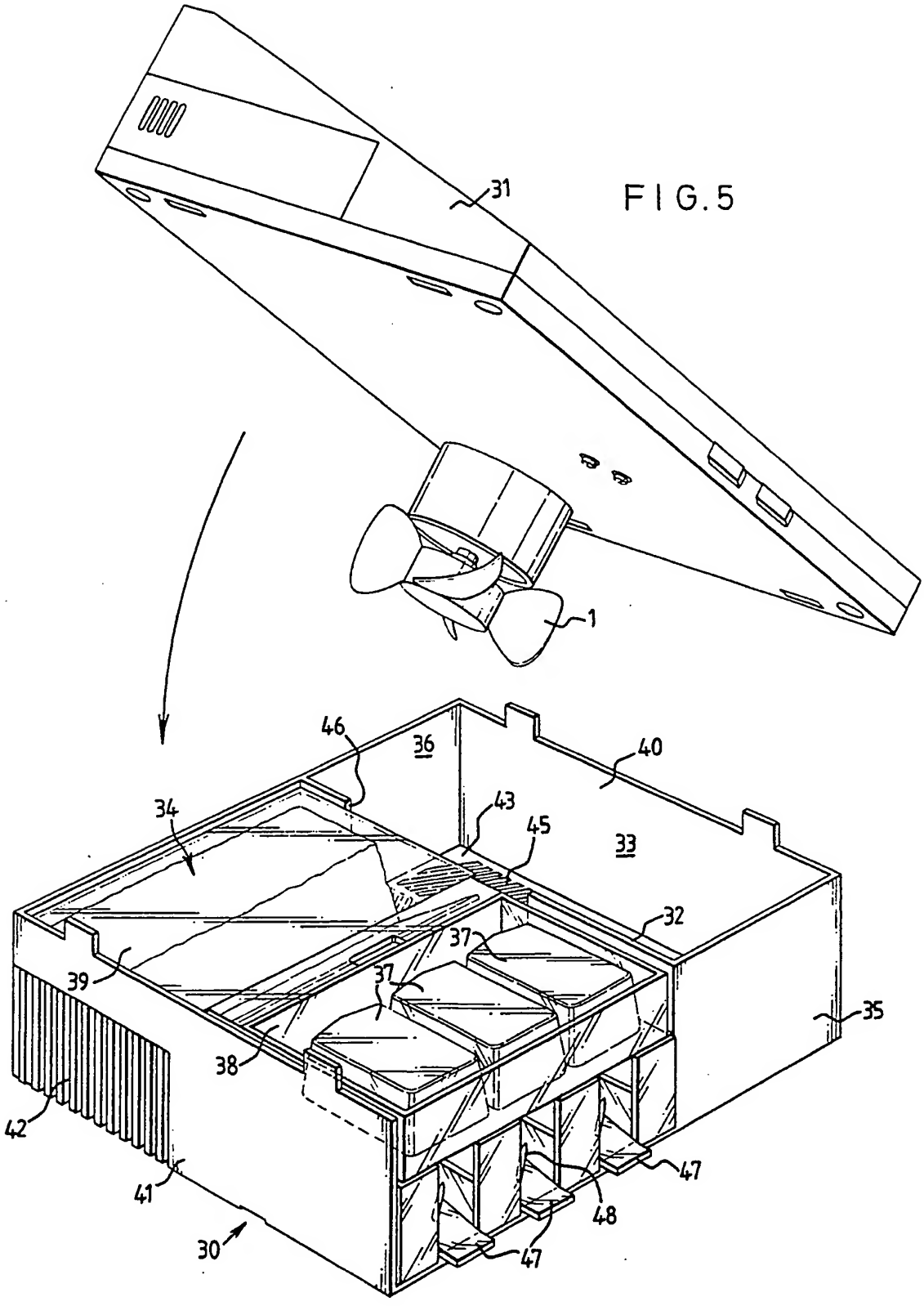

FIG.5

APPARATUS FOR DISPENSING, IN VAPOUR FORM, A VOLATILE LIQUID

This invention relates to apparatus for dispensing, in vapour form, a volatile liquid which may be a deodorant, a perfume, fragrancy, air freshener, insecticide, germicide or the like.

It is a common requirement to provide such apparatus which may be used in the home or a car. It is known to provide an apertured container having therein an absorbant pad impregnated with a volatile liquid. Over a period of time, the volatile liquid vapourises and is dispensed as a vapour through the apertures to the atmosphere in which the container is disposed and such apparatus is commonly found in the home. In British Patent Application No. 8904992.8, it is proposed to provide such apparatus having a plurality of holders, each of which hold a volatile liquid container, and an absorbant pad below the holders. Means are provided for rupturing the volatile liquid containers individually so that when the liquid with which the absorbant pad has been impregnated has wholly been vapourised, the pad can be reimpregnated by rupturing a container.

It is an object of this invention to provide improved apparatus for dispensing, in vapour form, a volatile liquid which is in insecticide, germicide, a deodorant, a perfume, a fragrancy, air freshener, or the like.

According to this invention, there is provided apparatus for dispensing, in vapour form, a volatile liquid which is an insecticide, germicide, deodorant, a perfume, a fragrancy, air freshener or the like, comprising a housing having an air inlet, at least one aperture permitting the egress of air and vapour from the interior of the housing, a volatile liquid holder, a fan, a motor coupled to the fan, the fan being positioned in the housing in relation to the inlet so that, when the motor is energised, it draws air into the housing through the air inlet, creates an air flow across the volatile liquid holder and discharges the air through the aperture or apertures, a rechargeable battery, a solar cell connected to the rechargeable battery via a charging circuit, and a timing circuit through which the rechargeable battery is connected to the motor, the timing circuit being arranged to energise the motor on an on/off basis.

Preferably the volatile liquid holder comprises an absorbant pad, a holder which is formed or disposed within the housing and serves to hold a volatile liquid container within the housing and above the pad, the volatile liquid container being wholly or partly of rupturable material, rupturing means for rupturing the container, the fan serving to create the air flow across the absorbant pad.

Preferably the charging circuit limits the charging rate of this battery.

Preferably the on/off basis is such that the motor is energised in each cycle for a period much shorter than that during which it is not energised.

The circuitry is desirably such that the motor should be energised preferentially by the solar cell, with the battery energy being, called upon, to make up to the required output of the total required energy when the solar energy provided is inadequate, due to, adverse climatic light conditions. Conversely, if the output of solar energy exceeds the motor requirements then the excess should be diverted to the battery to maintain charge. The battery is protected by a circuit to prevent overcharging of the battery when the input is no longer required, to maintain, full efficiency and to provide energy outside daylight hours should this be needed.

Apparatus for dispensing, in vapour form, a volatile liquid in accordance with this invention, will now be described, by way of example only, with reference to the accompanying drawings in which:-

Figure 1 is a block diagram of the electrical circuit of the apparatus;

Figure 2 is a circuit diagram of a current regulator forming part of the electrical circuit shown in Figure 1;

Figure 3 is a circuit diagram of an electronic timer circuit shown in Figure 1;

Figure 4 is a perspective view of the apparatus; and

Figure 5 is an exploded perspective view of the apparatus;

Figure 6 is a side view of the apparatus.

The apparatus includes a fan 1 driven by a motor 2, the fan 1 serving to drive air across an absorbant pad 3, impregnated with the volatile liquid. The flow path of the air through the apparatus and the manner in which the absorbant pad is impregnated will be described later and the electrical circuit will be described first.

Referring to Figure 1, a rechargeable battery or cell 4 energises the motor 2 via an electronic timer circuit 5 which has an on/off cycle in the ratio 1:14 and will be described in more detail later. The rechargeable battery 4 is trickle charged continuously (during daylight hours) by a solar cell 6 which is connected at one end to the positive terminal of the battery 4 via a current regulator 7 and a diode 8 and at the other end to the negative terminal of the battery 4.

Referring now to Figure 2, the solar cell 6 is manufactured by Chronar Limited and has an area of 10 x 6 cm amorphous silicon. When loaded, the solar cell 6 produces an output voltage of 2.7 volts but, if unloaded, produces an output voltage of 3.0 volts. The

circuit is designed so that the charging current supplied to the battery 4 is limited to 7.5 milliamps. The positive terminal of the solar cell 6 is connected via the forwardly connected diode 8 to the positive terminal of the rechargeable battery which is a nickel-cadmium battery. The rechargeable battery 4 has an output voltage of 1.3 volts and a maximum charge of 0.5 Ah.

Across solar cell 6 is connected the series circuit of two identical resistors 11 and 12 each rated at 22 K ohms so that half the voltage of the solar cell 6 appears at the junction of the resistors 11 and 12, i.e. the junction is at 1.3 volts in relation to the negative terminal of the solar cell 6. The negative terminal of the battery 2 is connected to the collector of a transistor 13 whose base is connected to the junction of the resistors 11 and 12 and whose collector is connected via a resistor 14 (rated at 82 ohms) to the negative terminal of the solar cell 6. Components 11, 12, 13 and 14 make up the current regulator 7. The voltage difference across the resistor 14 is 0.6 volts, taking into consideration the voltage across the battery 4 and the interelectrode voltages of the transistor 13 thereby limiting the charging current to 0.75mA.

Referring now to Figure 3, the motor 2 is connected between the 1.3 volt supply line 20 and a zero volt line 21, which is earthed, in series with the collector-emitter path of a control

transistor 22. The motor is designed to operate at 1.5 volts and to take account of 8 milliamps being a standard Mabuchi RF-330T motor and has been found to operate very satisfactorily at a supply of 1.3 volts, taking the maximum current of 8 milliamps.

The current through the transistor 22 is controlled by a standard 551 timer circuit 23 connected in conventional manner and arranged to give the motor 4 an on/off cycle of 1:14 continuously both day and night. The actual cycle is one minute on to 14 minutes off. The timer circuit includes an on/off switch 24 and when switch 24 is open, the timer 551 cuts off the transistor 22 so that motor 4 remains unenergised. The circuit also includes a boost button 25 which, when depressed, ensures that the motor 4 is energised for one minute whatever the point in the cycle of the timer 23.

It is to be noted that the rechargeable battery 4 has a 1.4 charging factor, i.e. it needs to receive 1.4 times the amount of charge it releases.

Referring now to Figures 4,5 and 6, the apparatus comprising an open, rectangular and flat housing 30 closed by a lid 31 which is trapezoidal in cross section. The housing 30 has a base 43, short sided 40 and 41 and long sided 35 and 36.

The housing 1 is divided by a wall 32 which is parallel to the short sides 40 and 41 of the housing 30 and divides the cavity within the housing 30 into a smaller rectangular space 33 (on the upper right hand side of Fig.5) and a larger rectangular space 34 on the lower left and i.e. side in Fig 5). The apparatus is used in the orientation in which the base 43 is vertical,the long sides 35 and 36 are horizontal and the short sides 40 and 41 are vertical with the long side 35 above the long side 36. In the upper half of the space 34 i.e. that towards the bottom of Fig.5, there are held three volatile liquid containers 37 of rupturable material. The containers 37 rest against an apertured horizontal wall 38 which is parallel to the upper and lower long sides 35 and 36 of the housing 30.

In the lower half of the space 34 i.e. that on the upper side of Fig 5, there is disposed a absorbant pad 39. The wall 32 is formed with a aperture 46 in register with the pad 39.

The vertical short sides 41 and 42 of the housing 30 are adjacent to the spaces 33 and 34 respectively. In register with the pad 39 the wall 41 is formed with an outlet 42. The base 43 of the housing 30 is formed with an air inlet 45 only visible in Fig 5.

The base 43 (which is normally vertical) of the housing 30 carries three pivoted vertical and parallel levers 47 each of which carries two pins 48 and each of which projects out of the housing 30

through the wall 35 so as to be manually operable. These levers 47 are pivoted about a common horizontal axis and their pins 48 are in register with the respective volatile liquid containers 36.

The lid 31 carries within it the electronic timer circuit 5, current regulator 7 and the diode 8 as well as the rechargable cell 4. The lid 31 also carries on its external surface the solar cell 6, clearly seen in Fig.4, and also carries various externally operable switches. The lid 31 also carries within it, the motor 2 and has projecting from its inner surface the fan 31. When the lid 31 is assembled to the housing 30, fan 1 projects into the space 33 of the inlet 43.

In use, one of the levers 46 is manually moved forward i.e. upwardly shown in Fig.5 causing the pins 47 to rupture the respective volatile liquid container 36. The volatile liquid drips through the wall 38 and impregnates the pad 39. On energisation the fan 1 draws air into the space 33 and drives that end through a gap 46 in the wall 32 and over the pad 39 picking up the vapour from the volatile liquid which vapourises. The air with the vapour is driven out of the housing through the outlet 42.

The volatile liquid could be contained in a solid, such as gel, wax, plastic, cellular foam, or fibrous material. Obviously, in this form the solid substrate would rely on the solar powered fan, to help diffuse through the egress vents, the active material.

It is conceivable that the container discharge mechanism could be used as a means of last moment mixing of different fluids should this be desirable. Suppose, for example:-

(a) It should prove desirable to provide alternative usage, i.e. two tanks of air freshener and one tank as an insecticide or germicide to cover a situation where insecticidal activity was also required.

(b) One tank could contain a booster (synergistic) solvent which could speed up the volatilisation rate if this was desired under special circumstances of increased activity level requirement.

Claims

1. Apparatus for dispensing, in vapour form, a volatile liquid which is an insecticide, germicide, deodorant, a perfume, a fragrancy, air freshener or the like, comprising a housing having an air inlet, at least one aperture permitting the egress of air and vapour from the interior of the housing, a volatile liquid holder, a fan, a motor coupled to the fan, the fan being positioned in the housing in relation to the inlet so that, when the motor is energised, it draws air into the housing through the air inlet, creates an air flow across the absorbant pad and discharges the air through the aperture or apertures, a rechargeable battery, a solar cell connected to the rechargeable battery via a charging circuit, and a timing circuit through which the rechargeable battery is connected to the motor, the timing circuit being arranged to energise the motor on an on/off basis.

2. Apparatus according to claim 1 wherein the volatile liquid holder comprises an absorbant pad, a holder which is formed or disposed within the housing and serves to hold a volatile liquid container within the housing and above the pad, the volatile liquid container being wholly or partly of rupturable material, rupturing means for rupturing the container, the fan serving to create the air flow across the absorbant pad.

3. Apparatus according to claim 1 or claim 2 wherein the charging circuit limits the charging rate of the battery.

4. Apparatus according to any of claims 1 to 3, wherein the on/off basis is such that the motor in energised in each cycle for a period much shorter than that during which it is not energised.

5. Apparatus according to any of claims 1 to 4 wherein the timing circuit includes a manually operable override which, when operated, causes immediate energisation of the motor.

6. Apparatus according to any of claims 1 to 5 wherein the holder holds a plurality of volatile liquid containers and wherein the rupturing means comprises a plurality of levers pivoted to the housing, equal in number to the volatile liquid containers, each being in register with a respective container and carrying a pin, and each being operable from the exterior of the housing to cause the pin it carries to rupture the respective volatile liquid container.

7. Apparatus for dispensing in vapour form, a volatile liquid, substantially as hereinbefore described with reference to the accompanying drawings.

Published 1992 at The Patent Office, Concept House, Cardiff Road, Newport, Gwent NP9 1RH. Further copies may be obtained from Sales Branch, Unit 6, Nine Mile Point, Cwmfelinfach, Cross Keys, Newport, NP1 7HZ. Printed by Multiplex techniques ltd, St Mary Cray, Kent.